

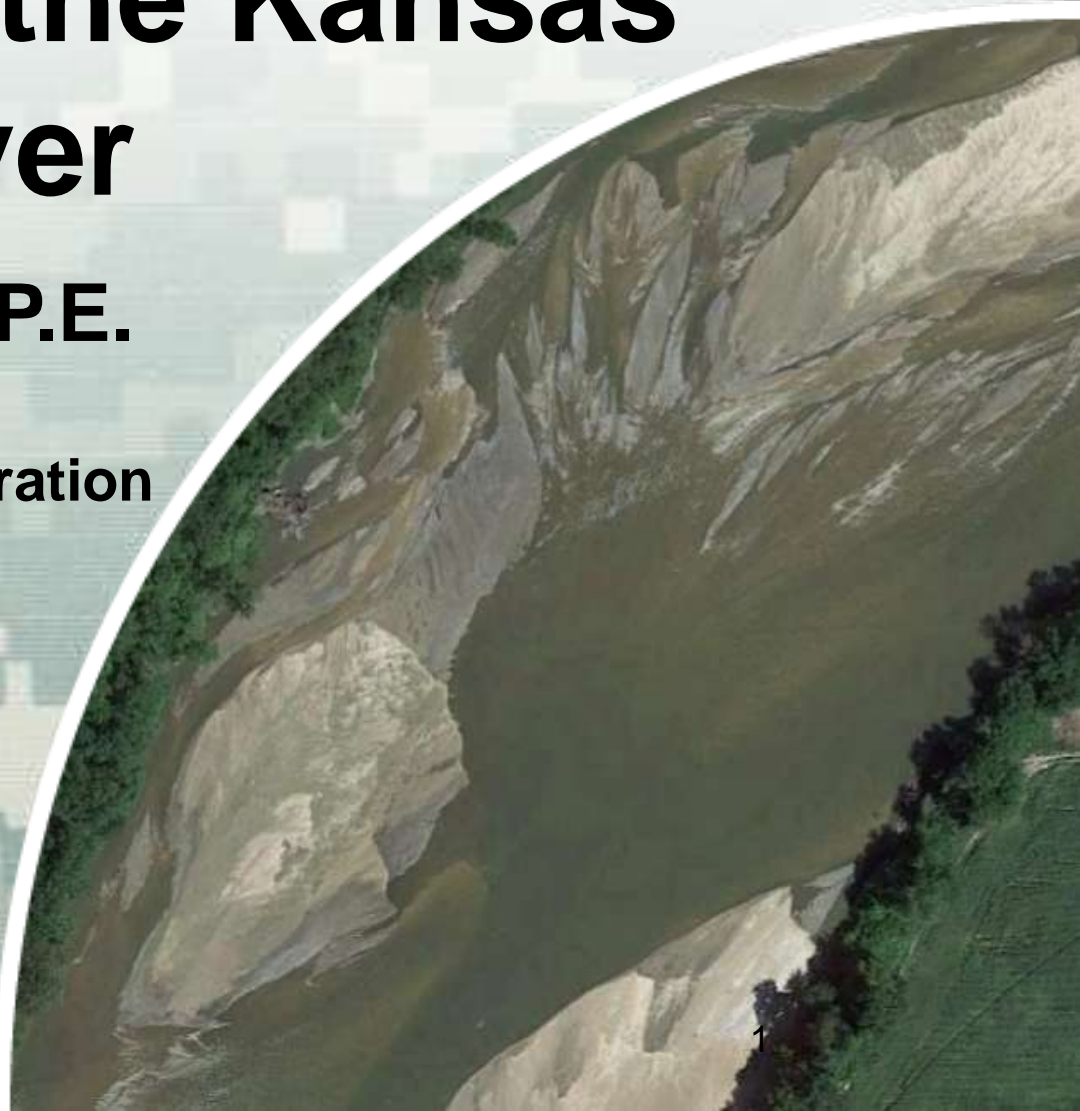
Environmental Benefits of Turbidity in the Kansas River

John Shelley, Ph.D., P.E.

Kansas City District

**River Engineering and Restoration
Section**

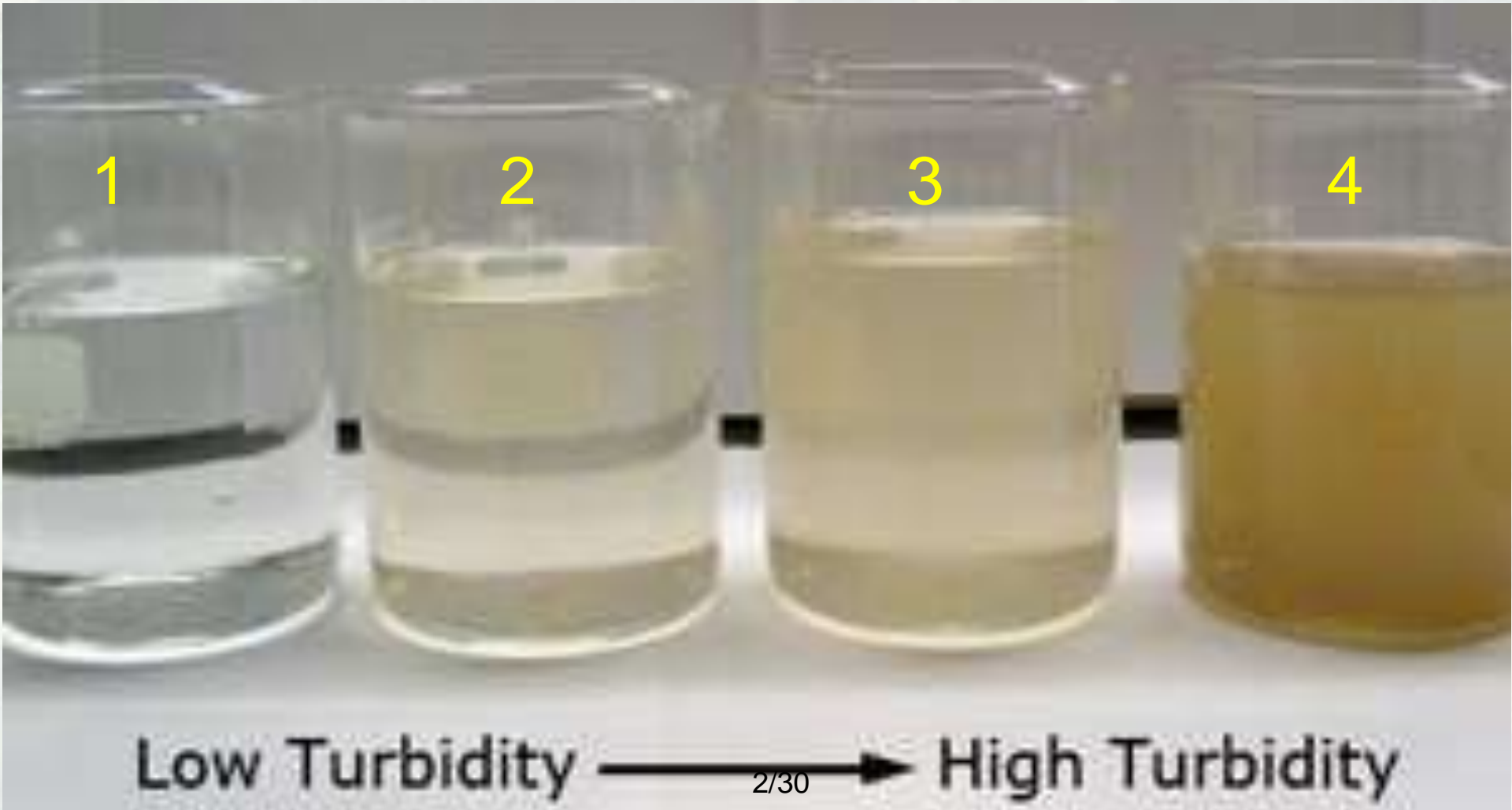
July 2015



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**US Army Corps of Engineers
BUILDING STRONG®**

Which is Better Water Quality for Riverine Environments?



- “Dirt was listed as the number one cause of pollution in our rivers and streams. When rain washes dirt into streams and rivers, it smothers the little critters in the stream and kills any fish eggs clinging to rocks. Dirt can also clog the gills of fish, suffocating them.”
(<http://water.epa.gov/learn/resources/bigpollutants.cfm>)



Kansas City District, Environmental Benefits of Turbidity in the Kansas River, John Shelley

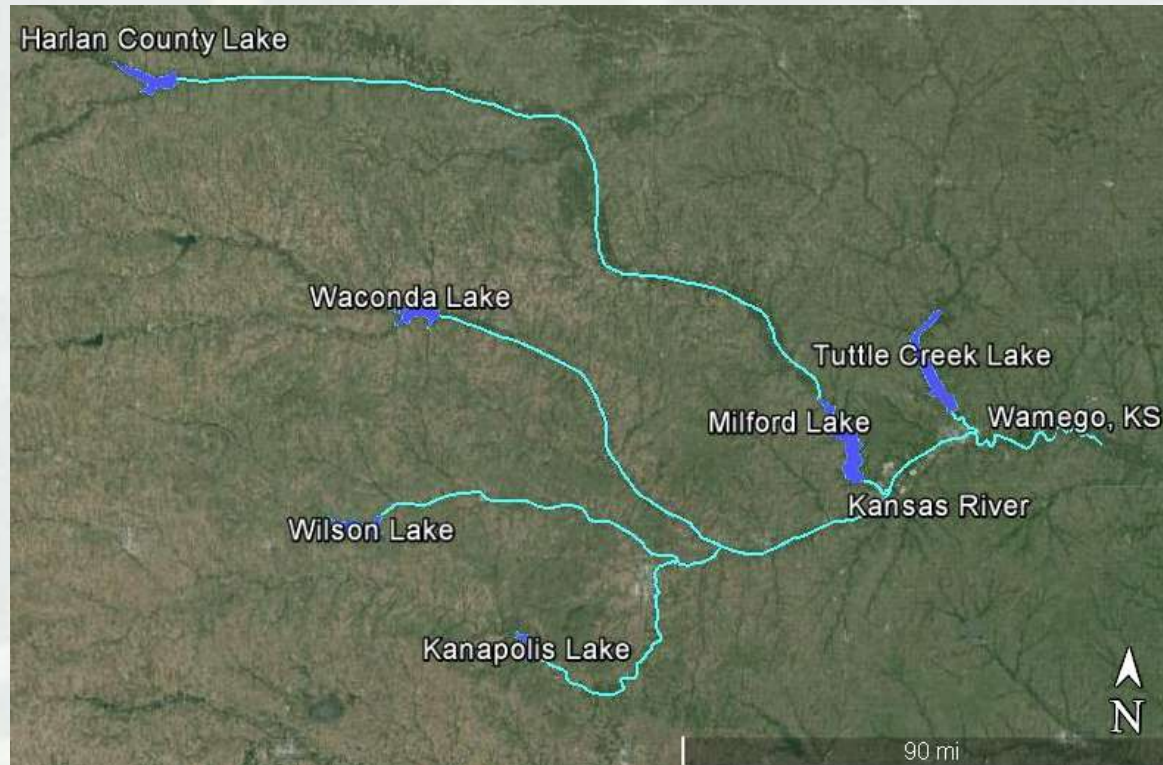
BLUF: (1) Document the environmental benefits of increasing turbidity in the Kansas River. (2) Site visit with State of Kansas personnel to a reservoir sediment management project.

Problem Statement/Issue

- Reservoirs are filling with sediment.
- Dredging with upland disposal is prohibitively expensive.
- Re-charge of sediments to the downstream channel is rarely attempted because of “environmental concerns” and permitting issues related to introducing sediment to rivers.

Approach to Address Problem (non-technical)

- Document the environmental benefits of turbidity in a historically-turbid system
- Document the natural “no dam” sediment level on the Kansas River
- View an operational project with downstream recharge of sediment and talk to the regulators involved

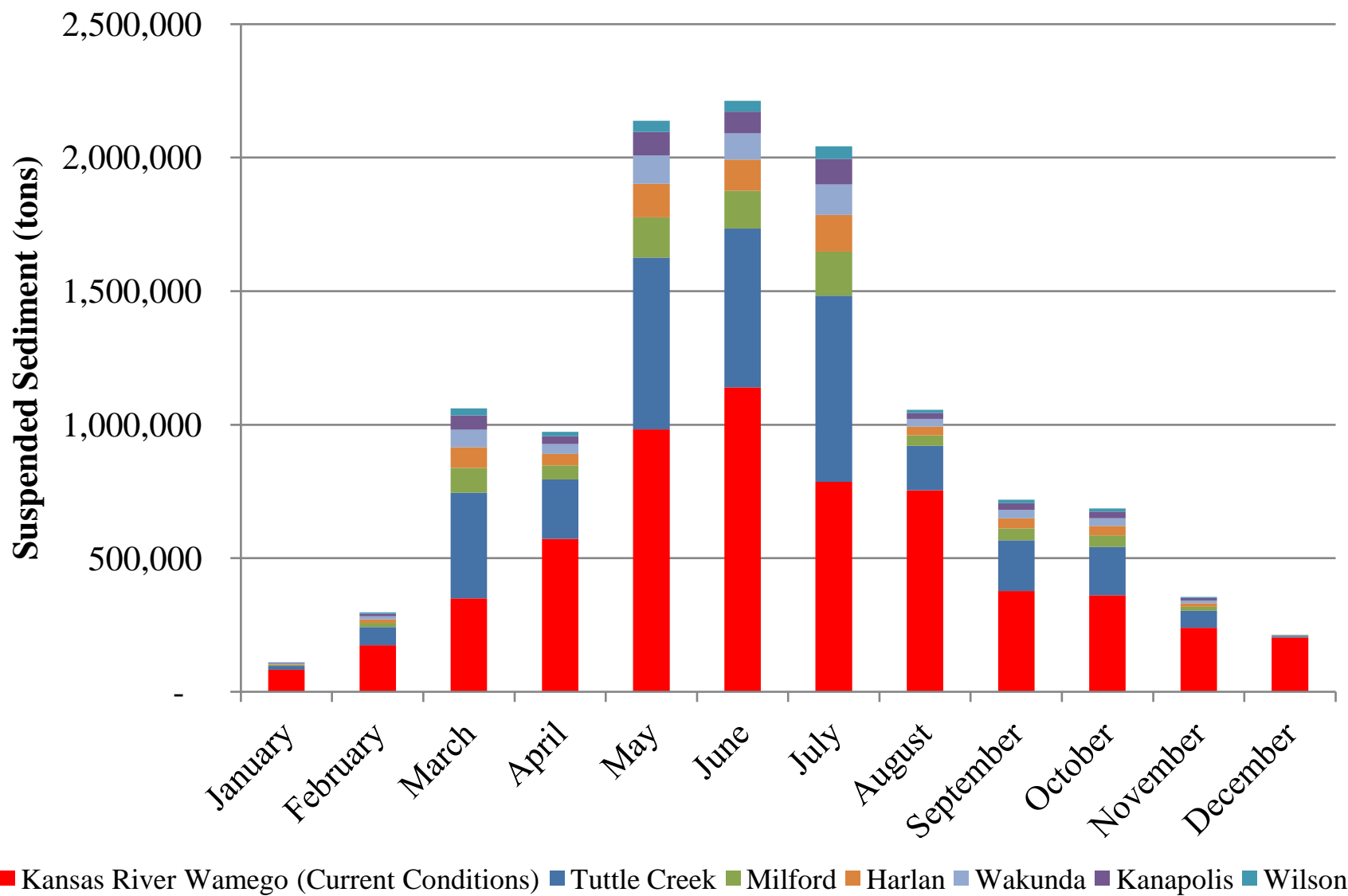


Approach to Address Problem

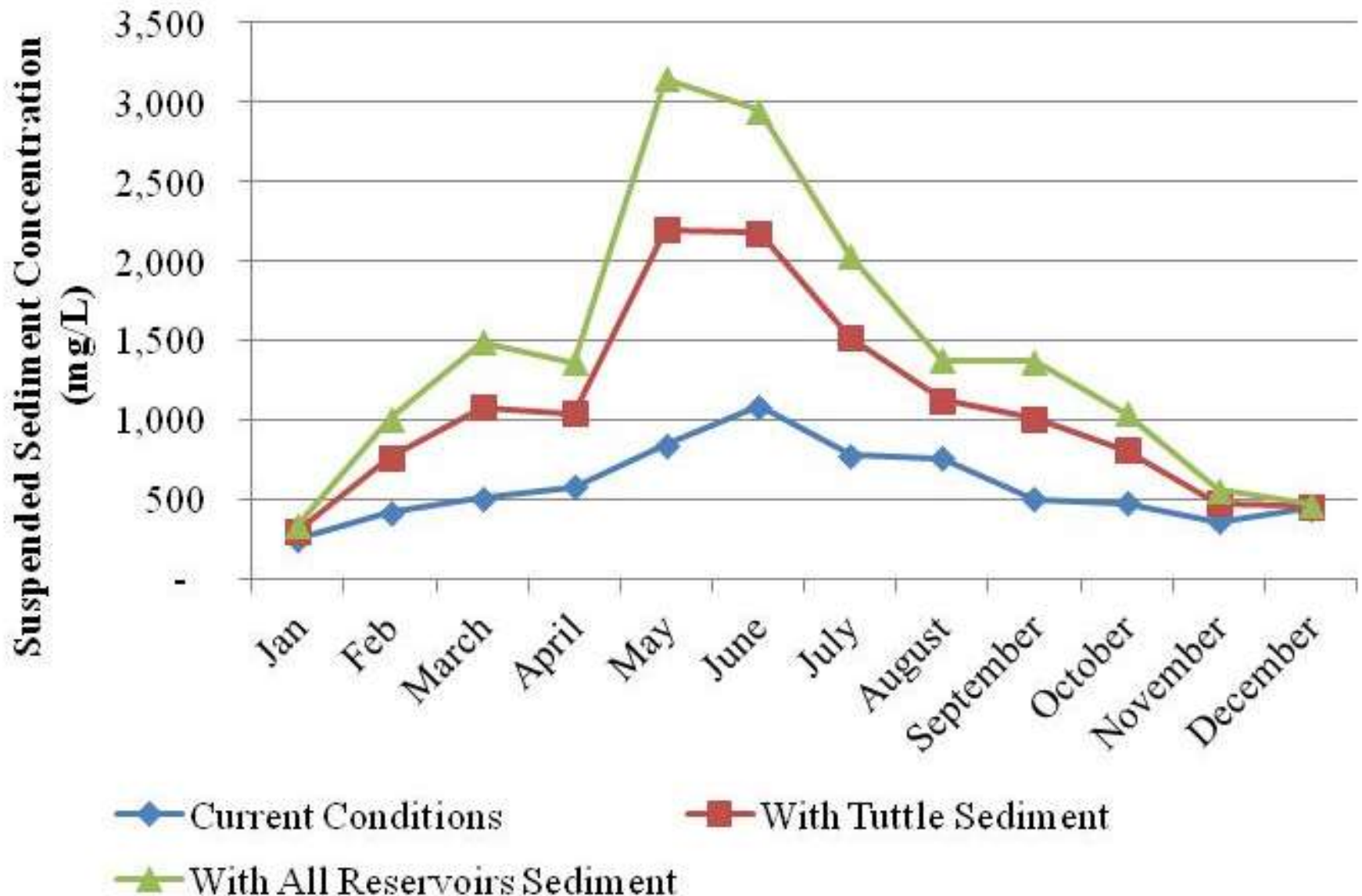
- Literature review/ Data mining
- Detailed sediment flux measurements at Tuttle Creek Lake
- Sediment accumulation records at other major reservoirs



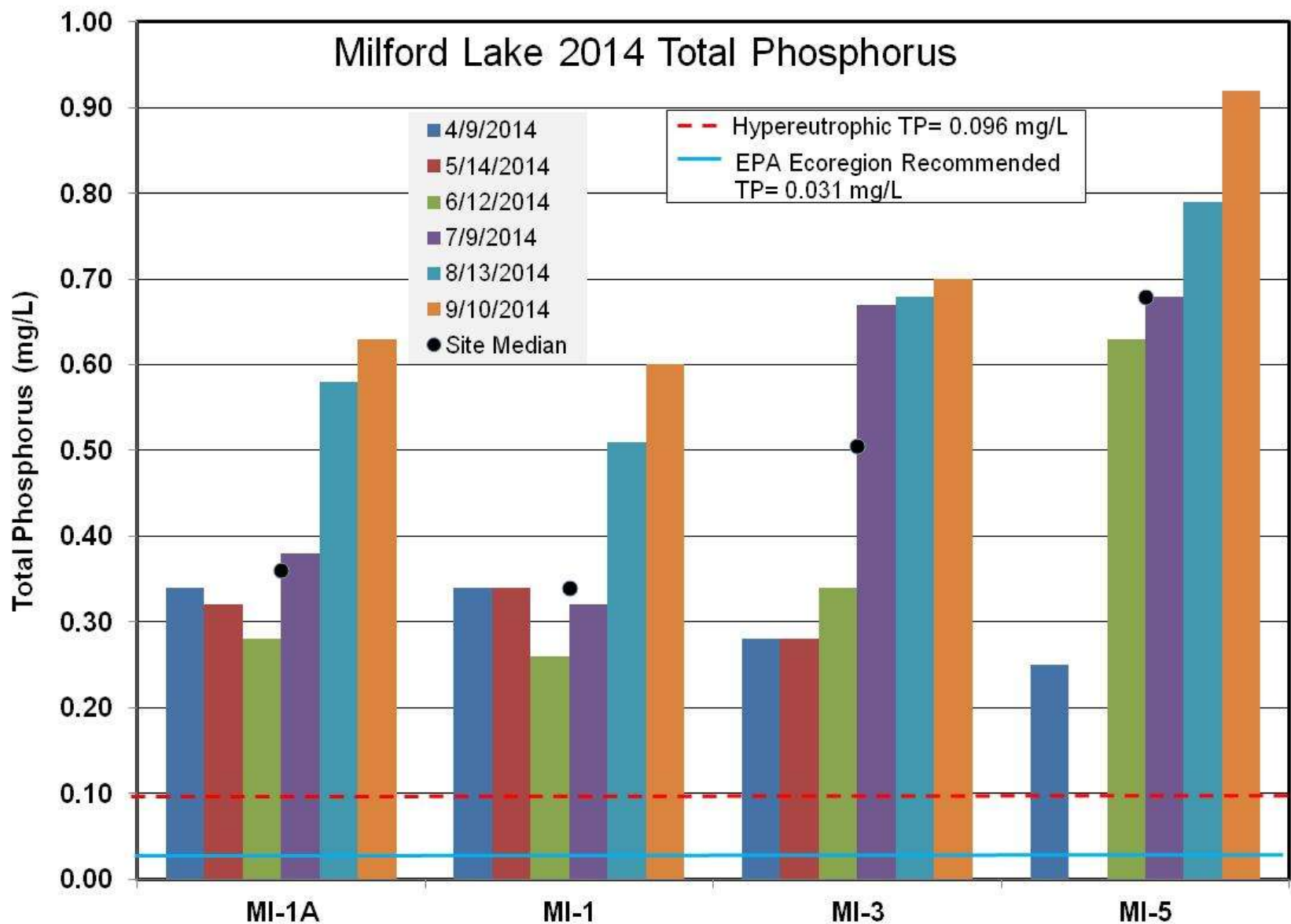
Findings



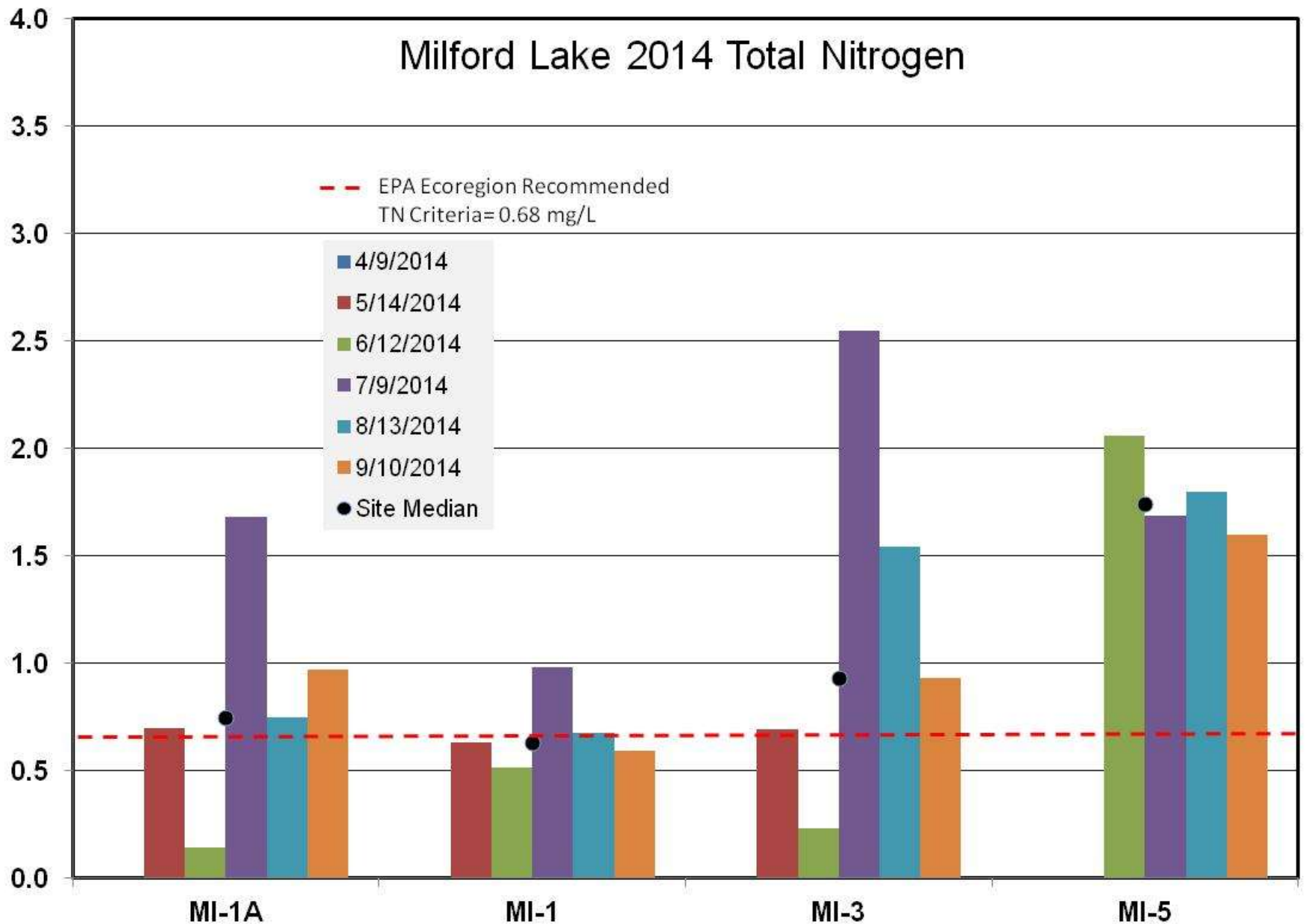
Findings



In-reservoir Effects



Milford Lake 2014 Total Nitrogen



Effect over time...

- Phosphorus binds to sediment, concentration increases as the sediment accumulates in the reservoir
- Nitrogen dissolves in the water, residence time decreases as the sediment accumulates in the reservoir
- TN:TP ratio = VERY LOW





Downstream Channel Effects

Shoal Chub



Flathead Chub



Western Silvery Minnow



Plains Minnow



Summary

- Sediment loads
- In-reservoir water quality
- Downstream channel ecology
- White Paper



Title: Environmental Benefits of Turbidity in the Kansas River

USACE RSM PDT

- John Shelley (Engineering)
- Aaron Williams (Engineering)
- Marvin Boyer (Water Quality)
- Jesse Granet (Ecology)
- Sarah Reznicek (Regulatory)
- Christina Ostrander (Planning)

Stakeholders/Partners

- Chris Gnau (Kansas Water Office)
- Margaret Fast (Kansas Water Office)

What key leveraging opportunity(s) did stakeholders/partners provide?

- Fish data
- Special invitation to present at the Governor's Water Conference (October)
- Support for follow-on work (inclusion in a Comprehensive Watershed Study)



UPs – 3 Positives from effort

- Gathered evidence of environmental benefit from turbidity
 - Leveraging previous state and federally funded studies
- Established the reasonable upper limit for the combined inputs from all Kansas River reservoir sediment management projects
- Something to cite
- Concurrently: DOTS request to look at hydrosuction sediment removal options



DOWNs – 3 Negatives from effort

- Next step...?
 - Funding cut to Section 204
 - No sediment management budget to begin with
- Site-visit postponed due to permitting issues



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Value to the Nation

- Increase potential feasibility/implementation funding mechanisms
- Permitting and compliance requirements improved (cost savings from reduction in requirements)
- May be sufficient to shift from a planning study to an O&M action as a P3 demonstration project

